User Manual

2.2KVA/3.2KVA

INVERTER / CHARGER

614-02303-04

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ABOUT THIS MANUAL

Purpose

This manual introduces the assembly, installation, operation and troubleshooting of inverter. Please read this manual carefully before installation and operation.

Target Group

This manual is designed for professionals and end users. Operations that do not require any specific skills can also be handled by the end users themselves. Professionals must have the following skills:

- Understand how the inverter works and operates
- After training, someone knows that how to deal with crises and risks in the installation and use of electrical equipment and devices
- After training, someone knows that how to install and commission electrical equipment and fixtures
- Understand the applicable standards and directives
- Understand and abide by this manual and all safety knowledge

SAFETY REGULATIONS

⚠ **Warning: This article contains important safety and operation instructions. Please read and save this manual for future reference.**

1. Please choose the corresponding setting according to whether to use lead-acid battery or lithium battery. If it is not set properly, the system may not operate normally.
2. Before using the unit , please read all the instructions and cautionary on the unit and understand all battery models and relevant chapters in this manual.
3. Never short-circuit AC output and DC input. Never connect the mains when the DC input is short-circuited.
4. Never charge a non-rechargeable battery.
5. Do not disassemble the unit. When maintenance or repair is needed, please send it to the professional technical service center. Incorrect reassembly may lead to electric shock or fire.
6. To reduce the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the device will not reduce this risk.
7. Be extra careful when using metal tools on or around the battery. Some potential risks, such as short circuit of batteries or other electronic components caused by sparks caused by falling tools, may lead to explosion.
8. In order to realize the optimal operation of this off grid solar inverter, please select the appropriate cable size according to the instruction. It is very important to operate the off grid solar inverter correctly.
9. When disconnecting AC or DC terminals, please strictly follow the installation procedure. For more details, please refer to "Installation" in this manual.
10. Grounding instruction this off grid solar inverter shall be connected to the permanent grounding wiring system. Be sure to comply with local requirements and regulations to install this inverter.
11. Provide a fuse that meets certain specifications for battery power supply as overcurrent protection.
12. **Warning! !** Only professional service personnel can repair this equipment. If there are still errors after troubleshooting, please send this off line solar inverter back to the local dealer or service center for maintenance.

INTRODUCTION

This is a multifunctional off grid solar inverter, which integrates MPPT solar charging controller, high-frequency pure sine wave inverter and UPS function module, and is very suitable for off-grid backup power supply and spontaneous self-use system. The design of high-frequency transformer enables the machine to provide reliable power conversion in a small size. This inverter can also work in battery-free mode.

The whole system also needs other equipment to achieve complete operation, such as photovoltaic modules, generator or utility grid. According to your requirements, please consult your system integrator to obtain other possible system components. WiFi module is a plug-and-play monitoring device installed on the inverter. With this device, users can monitor the running status of solar system anytime and anywhere through mobile phones or websites.

Features

- Pure sine wave output inverter
- According to the requirements of load (household appliances/personal computers), the input voltage range of utility grid can be selected
- According to the battery requirements, the charging current can be set through LCD
- Solar energy and utility grid can power loads at the same time
- AC intput is compatible with mains and generator
- Automatic restart function when mains power is restored
- Overload/ Over temperature/ short circuit protection
- The intelligent charging design of battery makes the battery more fully utilized
- RS485 port Used for communication with BMS
- Cold start function
- Intelligent fan speed adjustment, which adjusts the fan speed according to temperature, load and charging current
- Built-in MPPT, operating voltage range 55V~430V, open circuit voltage 450Voc
- WIFI remote monitoring (optional)

Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or mains electricity
- Solar module (optional)

Consult with your system integrator for other possible system architectures depending on your requirements. This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as tube light, fan, refrigerator and a ir conditioner.

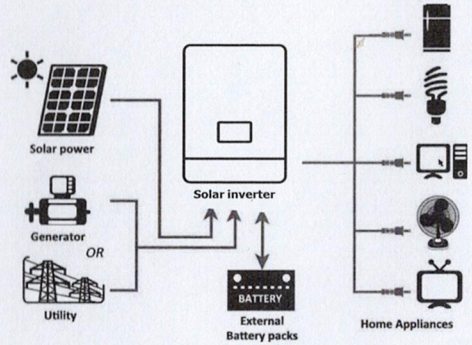
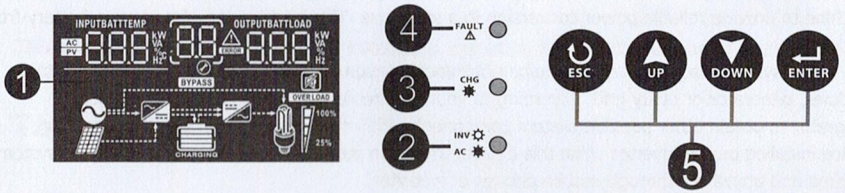
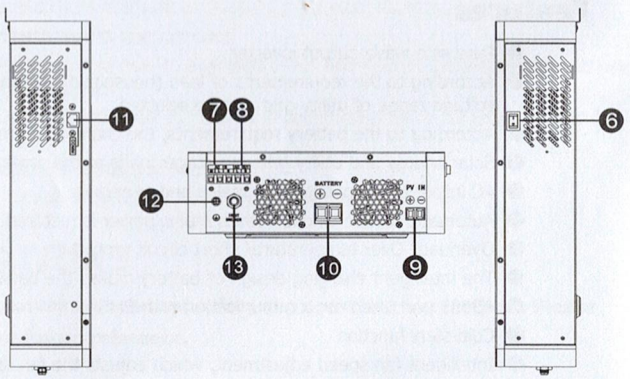


Figure 1 Hybrid Power System

Product Overview



1. LCD screen
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function keys
6. Power on/off
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232/RS485 communication port
12. Ground wire terminal
13. Circuit breaker



INSTALLATION

Unpacking And Inspection

Unpack the inverter and make sure there are no damaged objects in the package. You should have received the following items inside of package:

- Machine x 1
- User manual x 1

Preparation Before Installation

Before connecting all wirings, please take off bottom cover by removing two screws as shown below.

Installation

Please consider the following points before installing the equipment:

1. Do not install the inverter on flammable building materials;
2. Install on a solid surface;
3. Install this inverter at eye level in order to allow the LCD display to be read at all times;
4. Leave a gap of 20-50 cm for ventilation and heat dissipation of the equipment;
5. The equipment working environment temperature should be 0-55°C;
6. It is the best to install it vertically down against the wall, leaving a certain space with the ground.

⚠ **SUITABLE FOR INSTALLATION ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY**

Tighten the screws and fix the installation. Machine fixing screws: M4 or M5 screws are recommended.

Battery Connection

Lead-Acid Battery Connection

WARNING: In order to operate safely and comply with laws and regulations, it is required to install an independent DC overcurrent protector or disconnect device between the battery and the inverter.

WARNING: All wiring must be performed by a qualified personnel.

WARNING: It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and as below.

Recommended battery cable specifications:

Model	Wire specification		Torque value
2.2KVA-12V	1 * 4 AWG	22mm2	2-3 Nm
3.2KVA-24V	1 * 6 AWG	13mm2	2-3 Nm

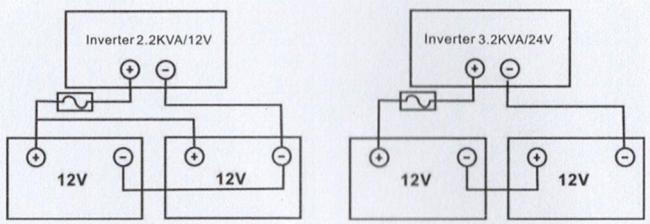
Note: The recommended charging current of lead-acid battery is 0.2C (C is battery capacity).

Please follow below steps to implement battery connection:

1. Connect the battery according to the recommended battery cable specifications.
2. Connect all battery packs as needed.
3. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and tighten the ring terminal with the battery terminal.

⚠	**WARNING:** Shock Hazard Installation must be performed with care due to high battery voltage in series.
⚠	**CAUTION! !** Do not place anything between the flat part of the inverter terminal and the ring terminal, otherwise,It may cause short circuit or overheating.
⚠	**CAUTION! !** Do not apply antioxidant to the terminal before it is tightly connected.
⚠	**CAUTION! !** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative(-).

4. Connect all battery packs in the following table.



Lithium Battery Connection

If choosing lithium battery for the inverter, only lithium batteries that have been matched with BMS communication protocol are allowed.

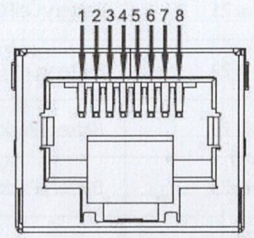
1. Connect the battery according to the recommended battery cable specifications.
2. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and that the ring terminal is tightened with the battery terminal.
3. Connect one side of RJ45 cable to the BMS communication port of inverter.
4. Insert the other side of RJ45 cable into RS485 communication port on lithium battery.

Note: If you choose a lithium battery, please make sure to connect the battery and inverter with BMS communication cable, and select the battery type as "LIB" mode.

Communication And Setting Of Lithium Battery

1. Connect the RJ45 communication cable between inverter and battery. Please confirm that the lithium battery BMS port's PIN is correspond with the inverter BMS communication port. The inverter BMS port's PIN definition as below:

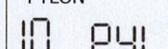
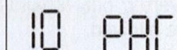
Pin number	Port definitions
1	TX
2	RX
3	VCC
4	VCC
5	RS485A
6	RS485B
7	GND
8	GND



Communication port pin definition

2. In order to communicate with the lithium battery BMS, you should press the "ENTER" button for a long time, and set the battery type as "LIB" in program 05. Then select the matching battery protocol in Program 10 .

05	Battery type	AGM (default) 05 AGn
		Flooded 05 FLd
		User Defined 05 USE
		Lithium battery mode 05 Lib
		Lithium battery communication mode Lib 05 485

10	Lithium battery protocol	PYLON 	
		PACE 	

3. In "LIB" mode, press and hold the "ESC" button to view the information of the lithium battery, and the inverter display screen will enter the following screen (the initial interface shows the total battery voltage and remaining battery capacity).
Press the "DOWN" button to display the following data in turn.

Battery voltage	The remaining battery capacity
Battery charging current	Battery discharge current
The rated capacity of the battery	Cycle charge and discharge times
BMS board temperature	MOS temperature
The maximum voltage of single battery cell	The minimum voltage of single battery cell
The maximum temperature of single battery	The minimum temperature of single battery

Battery Alarm Code

Alarm code	Alarm event	Icon flashing
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	
24	Battery Pack Under Voltage	
25	Charging Over Current	
26	DischargingOver Current	
27	Charging Cell Over Temperature	
28	DischargingCell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
34	Battery capacity is too low	
44	Battery Cell Voltage Imbalance	
45	Battery Cell Temperature Imbalance	
46	Internal CommunicationAlarm	

Battery fault code

Fault code	Fault event	The icon is long and bright
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	
24	Battery Pack Under Voltage	
25	Charging Over Current	
26	DischargingOver Current	
27	Charging Cell Over Temperature	
28	DischargingCell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
31	Ambient Over Temperature	
32	Ambient Under Temperature	
33	MOS Over Temperature	
35	Battery Short Circuit	
36	Charge Overvoltage	
37	System Failure	
39	Charging MOS Fault	
40	Discharge MOS Fault	
41	Temperature Sensor Fault	
42	Battery Cell Fault	
43	Sampling CommunicationFailure	
61	CommunicationFailure	

AC Input/Output Connection

CAUTION! ! Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input.

CAUTION! ! There are two terminal blocks with "IN" and "OUT'markings. Please do NOT mis-connect input and output connectors.

WARNING! ! All wiring must be performed by a qualified personnel.

WARNING! ! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suitable cable specifications for AC wires

Model	Wire Gauge	Torque Value
2.2KVA-12V	1 * 12 AWG	1.2-1.6 Nm
3.2KVA-24V	1 * 10 AWG	1.2-1.6 Nm

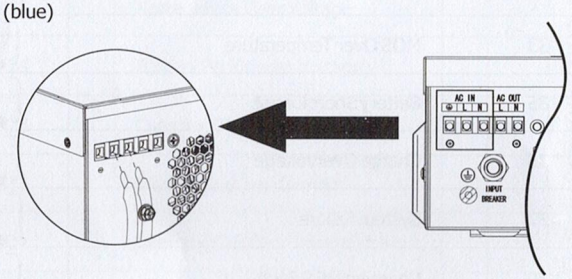
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

   ⏚→Ground (yellow-green)

   L→ LINE (brown or black)

   N→ Neutral (blue)

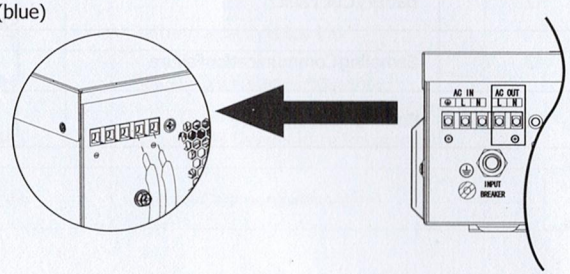


⚠	**WARNING:** **Be sure that AC power source is disconnected before attempting to hardwire it to the unit.**

4. Then, insert the AC output conductor according to the polarity identification at the terminal, and tighten the screw.

   L→ LINE (brown or black)

   N→ Neutral (blue)



5. Make sure the wires are firmly connected.

⚠	**CAUTION:** Please ensure that all AC cables are connected correctly according to the corresponding polarity.
⚠	**CAUTION:** Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

CAUTION: Before connecting the PV module, please install separately a DC circuit breaker between the inverter and PV module.

WARNING! ! All wiring must be performed by a qualified personnel.

WARNING! ! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Gauge	Torque Value
2.2KVA-12V	1 * 16 AWG	1.2-1.6 Nm
3.2KVA-24V	1 * 16 AWG	1.2-1.6 Nm

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min battery voltage.

Model	2.2KVA-12V	3.2KVA-24V
PV open circuit voltage	450Vdc	
MPPT operating voltage range	55Vdc~430Vdc	

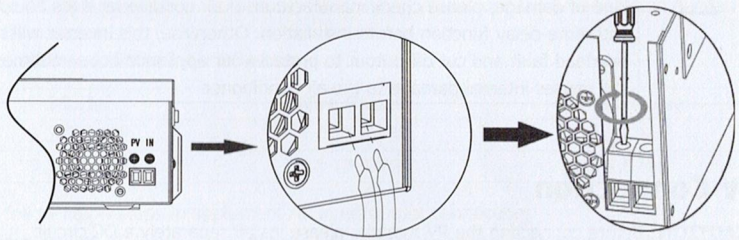
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table:

Solar panel parameters -250Wp -Vmp: 30.1Vdc -Imp: 8.3A -Voc: 37.7Vdc -Isc: 8.4A -Cells: 60	Solar Input Range (Min in serial: 6 pcs, max in serial: 11 pcs)	Q'ty of panels	Total Input
	3 pcs in serial	3	750W
	4 pcs in serial	4	1000W
	5 pcs in serial	5	1250W
	6 pcs in serial	6	1500W
	8 pcs in serial	8	2000W
	11 pcs in serial	11	2750W

3. Equipment Assembly

Please follow below steps to implement PV module connection:

1) Remove insulation sleeve 10 mm for positive and negative conductors.
2) Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+)of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.
3) Make sure the wires are securely connected.



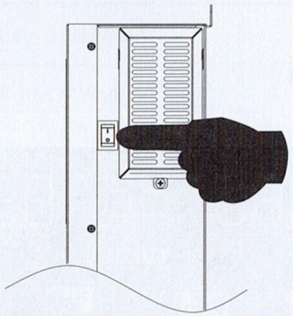
Final Assembly

After connecting all the wires, put the bottom cover back and screw the screws.

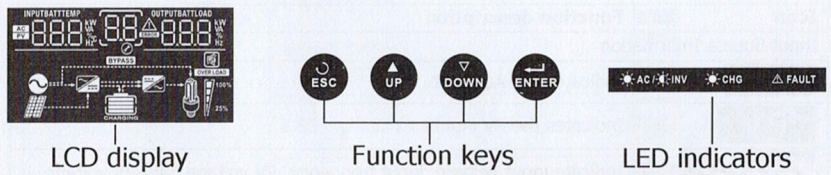
OPERATION

Power On/Off

After installing the machine correctly and connecting the battery correctly, just press the On/Off switch to turn on the machine.



Operation And Display



The operation and display panel is shown in the following figure, which is located on the front panel of the inverter. It includes four function keys and an LCD screen for indicating operationstatus and input/output power information.

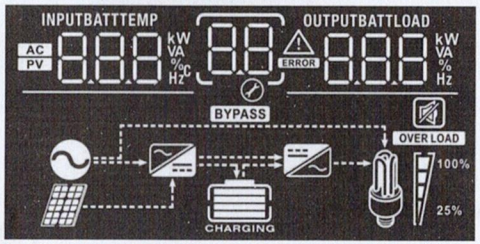
LED Indicator

LED Indicator			Messages
☀AC/☀INV	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
☀CHG	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
⚠FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display Icons



Icon	Function description	
Input Source Information		
AC	Indicates the AC input.	
PV	Indicates the PV input	
INPUTBATT 888 kW VA % Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.	
Configuration Program and Fault Information		
88	Indicates the setting programs.	
88 ⚠	Flashing with warning code.	
88 ERROR	Lighting with fault code	
Output Information		
OUTPUTBATTLOAD 888 kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.	
Battery Information		
CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.	
In AC mode, it will present battery charging status.		
Status	Battery voltage	LCD Display
Constant Current mode/ Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.
In battery mode, it will present battery capacity.		
Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.717V/cell	
	1.717V/cell ~ 1.8V/cell	
	1.8 ~ 1.883V/cell	
	> 1.883 V/cell	
50%> Load > 20%	< 1.817V/cell	
	1.817V/cell ~ 1.9V/cell	
	1. 9 ~ 1. 983V/cell	
	> 1.983V/cell	
Load< 20%	< 1.867V/cell	
	1.867V/cell ~ 1.95V/cell	
	1.95 ~ 2.033V/cell	
	> 2.033 V/cell	

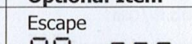
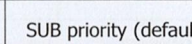
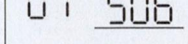
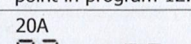
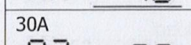
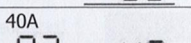
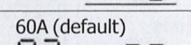
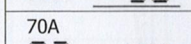
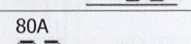
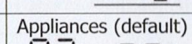
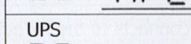
Load Information				
OVER LOAD	Indicates overload.			
100% 25%	Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%.			
	0~24%	25~50%	50%~75%	75%-100%

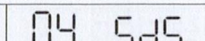
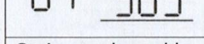
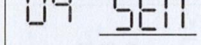
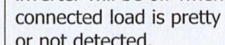
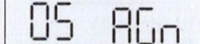
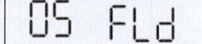
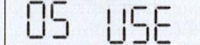
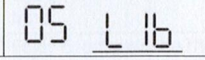
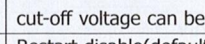
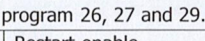
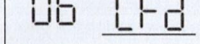
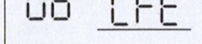
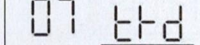
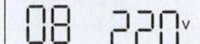
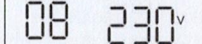
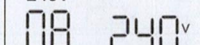
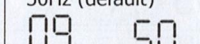
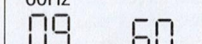
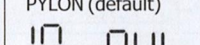
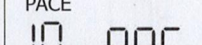
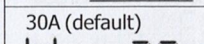
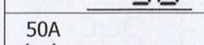
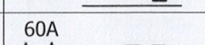
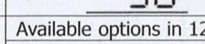
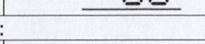
Mode Operation Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
BYPASS	Indicates load is supplied by utility power.
	Indicates the utility charger circuit is working.
	Indicates the DC/AC inverter circuit is working.
	Indicates unit alarm is disabled.

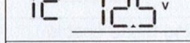
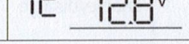
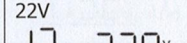
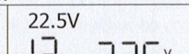
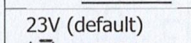
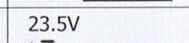
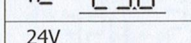
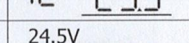
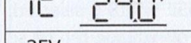
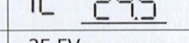
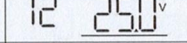
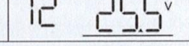
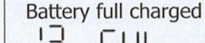
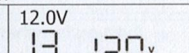
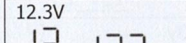
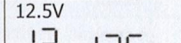
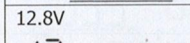
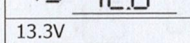
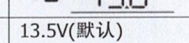
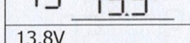
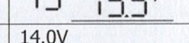
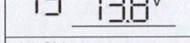
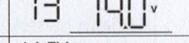
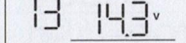
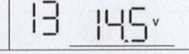
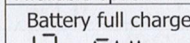
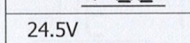
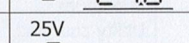
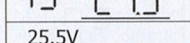
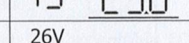
LCD Setting

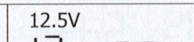
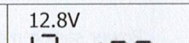
After pressing and holding"ENTER" button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER"button to confirm the selection or "ESC" button to exit.

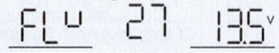
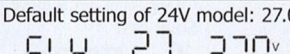
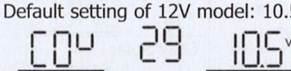
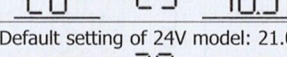
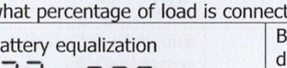
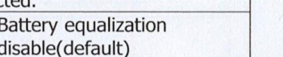
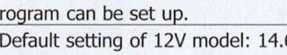
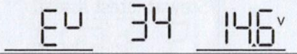
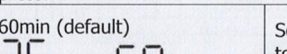
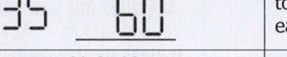
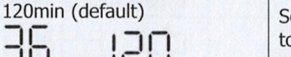
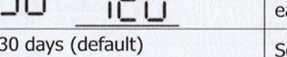
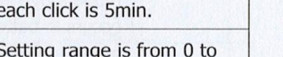
Setting Programs:

Option	Describe	Optional Item	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	SUB priority (default) 	Solar energy gives priority to supplying power to the load. If solar energy can't effectively provide all connected loads, Utility will provide power to the loads at the same time.
		SBU priority 	Solar energy gives priority to supplying power to the load. If solar energy cannot effectively provide all connected loads, the battery will supply power to the loads at the same time.Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers.	10A	20A 
		30A 	40A 
		50A	60A (default) 
		70A 	80A 
03	Ac input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Saving mode disable(default)	If disabled, no matter connected load is low or

04	Power saving mode enable/disable		high, the on/off status of inverter output will not be effected.
		Saving mode enable 	If enabled, the output of inverter will be off when connected load is pretty low or not detected.
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	LIB 
		If USE or LIB is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.	
06	Auto restart when overload occurs	Restart disable(default) 	Restart enable 
07	Auto restartwhen over temperature occurs	Restart disable(default) 	Restart enable 
08	Output voltage	220V 	230V (default) 
		240V 	
09	Output frequency	50Hz (default) 	60Hz 
10	Lithium battery protocol	PYLON (default) 	PACE
11	Maximum Utility charging current	10A 	20A 
		30A (default) 	40A 
		50A	60A
12	Setting voltage point back to utility source when selecting"SBU priority"	Available options in 12V models:	
		11.0V 	11.3V
		11.5V (default) 	11.8V 
		12.0V 	12.3V 

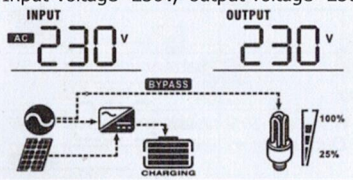
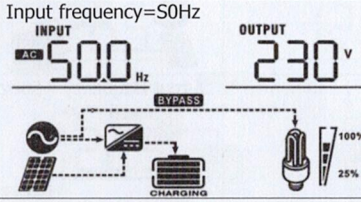
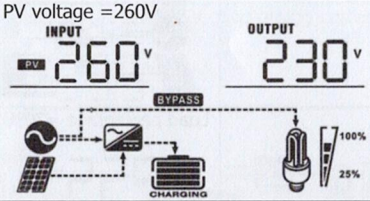
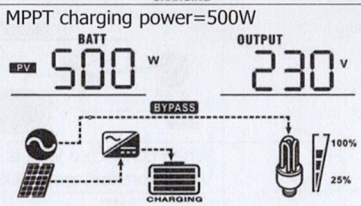
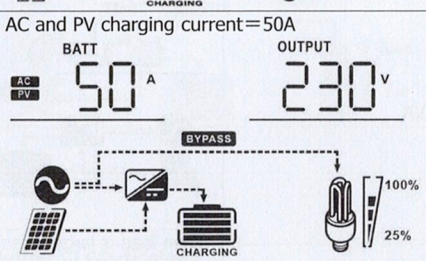
		12.5V 	12.8V 
		Available options in 24V models:	
		22V 	22.5V 
		23V (default) 	23.5V 
		24V 	24.5V 
		25V 	25.5V 
13	Setting voltage point back to battery mode when selecting "SBU priority" in program 01	Available options in 24V models:	
		Battery full charged 	12.0V 
		12.3V 	12.5V 
		12.8V 	13.0V 
		13.3V 	13.5V(默认)
		13.8V 	14.0V 
		14.3V 	14.5V 
		Available options in 24V models:	
		Battery full charged 	24V 
		24.5V 	25V 
		25.5V 	26V
		26.5V 	27V (default) 
		27.5V 	28V 
		28.5V	29V

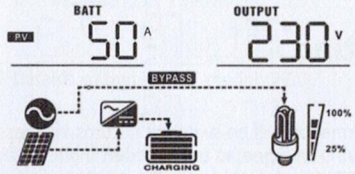
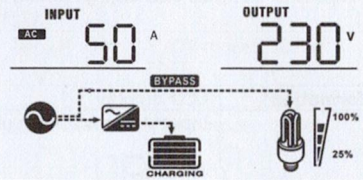
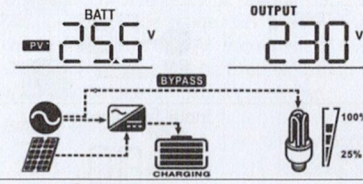
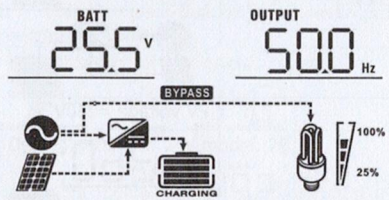
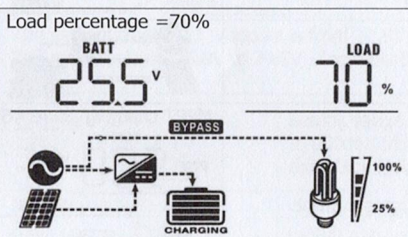
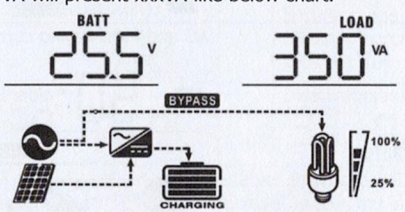
			
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line,Standby or Fault mode, charger source can be programmed as below:	
		Solar first	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility(default)	Solar energy and utility will charge battery at the same time.
		Only Solar	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Alarm control	Alarm on (default)	Alarm off
19	Auto return to default display screen	Return to default display screen(default)	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on(default)	Backlight off
22	Beeps while primary source is interrupted	Alarm on (default)	Alarm off
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default)	Bypass enable
25	Record fault code	Record enable	Record disable(default)
26	Bulk charging voltage (C.V voltage)	Default setting of 12V model: 14.1V	
		Default setting of 24V model: 28.2V	
		If USE or LIB is selected in program 5, this program can be set up. Set voltage range, 12V model: from 12V to 14.6V; 24V model: from 24V to 29.2V, and each press increases by 0.1V.	

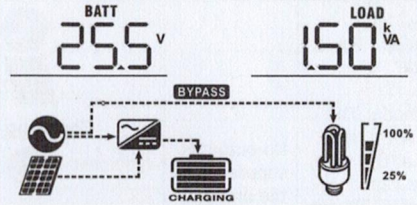
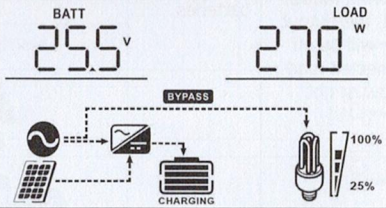
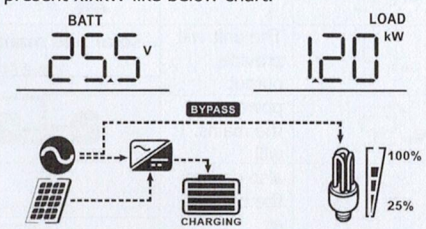
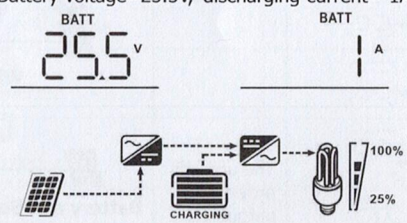
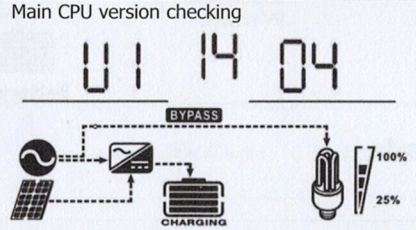
27	Floating charging voltage	Default setting of 12V model: 13.5V 	
		Default setting of 24V model: 27.0V 	
		If USE or LIB is selected in program 5, this program can be set up. Set voltage range, 12V model: from 12V to 14.6V; 24V model: from 24V to 29.2V, and each press increases by 0.1V.	
29	Low DC cut-off voltage	Default setting of 12V model: 10.5V 	
		Default setting of 24V model: 21.0V 	
		If USE or LIB is selected in program 5, this program can be set up. set voltage range, 12V model: from 10V to 12V; 24V model: from 20V to 24V, Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.	
33	Battery equalization	Battery equalization 	Battery equalization disable(default) 
		If "Flooded"or "User-Defined"is selectedin program 05, this program can be set up.	
34	Battery equalization voltage	Default setting of 12V model: 14.6V 	
		Default setting of 24V model: 29.2 	
		The setting range of 12V model is from 12.5V to 14.7V, and 24V model is from 25.0V to 29.5V . Increase by 0.1V per press.	
35	Battery equalized time	60min (default) 	Setting range is from 5 min to 900min.Increment of each click is 5min.
36	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min.Increment of each click is 5min.
37	Equalization interval	30 days (default) 	Setting range is from 0 to 90 days.Increment of each click is 1 day
39	Equalization activated immediately	Enable 	Disable(default) 
		If equalization function is enabled in program 33, this program can be set up.If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD mainpage will shows "Eq".If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37setting. At this time, ""will not be shown in LCD main page.	

Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, MPPT charging current,MPPT charging power, battery voltage, output voltage, output frequency, load percentage, load in VA,load in Watt, DC discharging current, main CPU Version and second CPU Version.

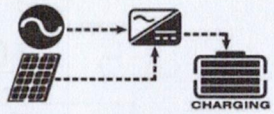
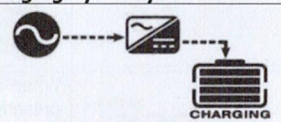
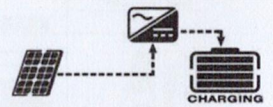
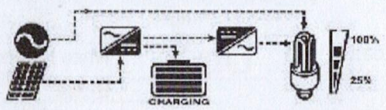
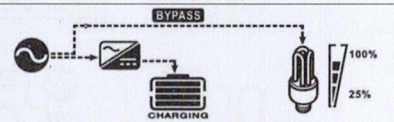
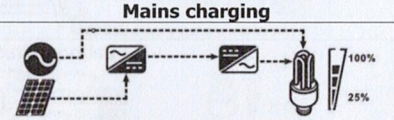
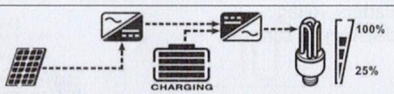
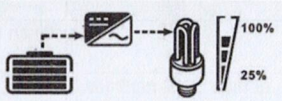
Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V 
Input frequency	Input frequency=S0Hz 
PV voltage	PV voltage =260V 
MPPT Charging current	MPPT charging power=500W 
Charging current	AC and PV charging current=50A 

	PV charging current=50A 
	AC charging current=50A 
Battery voltage/ Output voltage	Battery voltage=25.5V, Output voltage=230V 
Output frequency	Output frequency =50Hz 
Load percentage	Load percentage =70% 
Load in VA	When connected load is lower than lkVA, load in VA will present xxxVA like below chart. 
	When load is larger than lkVA, load in VA will present x.xkVA like below chart.

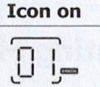
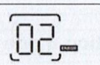
	
Load in Watt	When load is lower than lkW, load in W will present xxxW like below chart. 
	When load is larger than lkW, load in W will present x.xkW like below chart. 
Battery voltage/ DC discharging current	Battery voltage=25.5V, discharging current= 1A 
Main CPU version checking	Main CPU version checking 

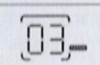
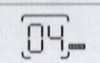
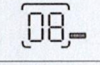
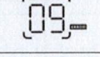
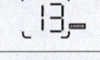
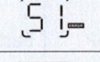
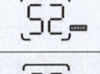
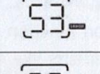
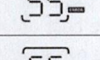
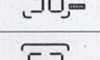
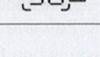
Operating Mode Description

Operation mode	Description	LCD display

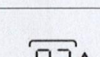
Standby mode / Power saving mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output. *Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.	No output is supplied by the unit but it still can charge batteries.	 **Charging by utility and PV energy.**  **Charging by utility.**  **Charging by PV energy.**
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	 **solar and mains supply power to loads at the same time**  **Mains charging**  **Without Battery Mode**
Battery Mode	The unit will provide output power from battery and PV power.	 **Battery and Solar supply power to loads at the same time**  **Battery supply power to loads**

Fault Code

Fault Code	Fault Event	Icon on
01	Fan is locked when the inverter is turned off.	
02	Over temperature	

03	Battery voltage is too high	
04	Battery voltage is too low	
05	Output short circuit or over temperature.	
06	Output voltage is too high	
07	Exceeding overload time	
08	BUS voltage is too high	
09	BUS soft start failed.	
13	PV voltage is too high	
51	Over current and surge	
52	BUS voltage is too low	
53	Inverter soft start failed.	
55	Over DC voltage in AC output	
56	Battery is disconnected	
57	Current sensor failed.	
58	Output voltage is too low	

Warning code

Warning Code	Warning Event	Automatic Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
03	Battery overcharge	Beep once every second	

04	Battery low voltage	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power is derating	Beep twice every 3 seconds	
15	PV energy is weak	No Beep	
EQ	Battery equalization	No Beep	
bP	Battery is not connected.	No Beep	

BATTERY EQUALIZATION

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.

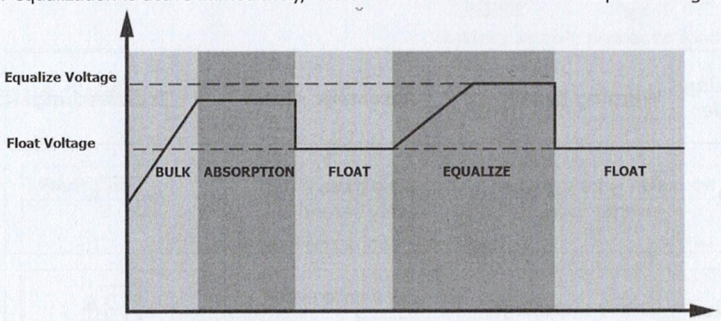
- How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

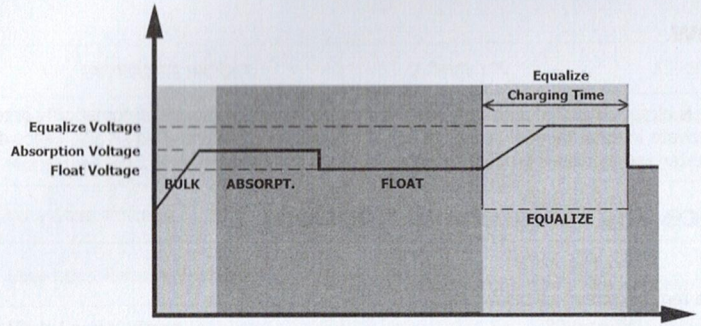
- When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

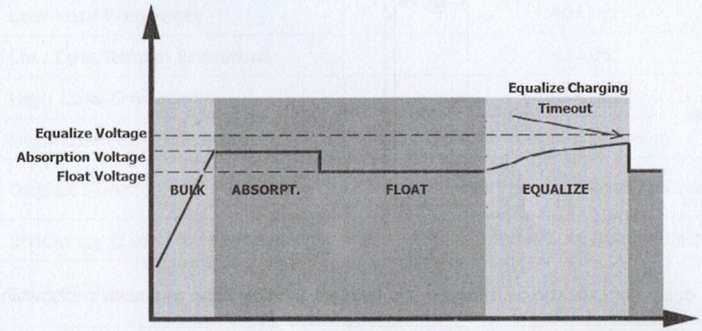


- Equalize charging time and time out

In equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raise s to battery equalization voltage. Then, constant voltage regulation is applied to maintain battery voltage at the battery e qualization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized time out setting is over, the charge controller will stop equalization and return to float stage.



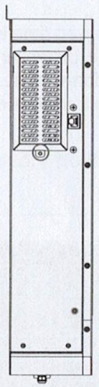
CLEARANCE AND MAINTENANCE FOR ANTI - DUST KIT (Optional)

Overview

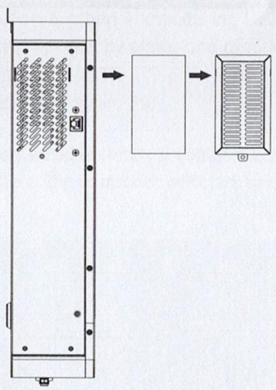
Every inverter is already installed with anti-dusk kit from factory. Inverter will automatically detect this kit and activate internal thermal sensor to adjust internal temperature. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

Clearance and Maintenance(option)

Step 1: Please remove screws as below.



Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.



Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

NOTICE: The anti-dust kit should be cleaned from dust every one month.

SPECIFICATIONS

Table 1 Specification of LINE Mode

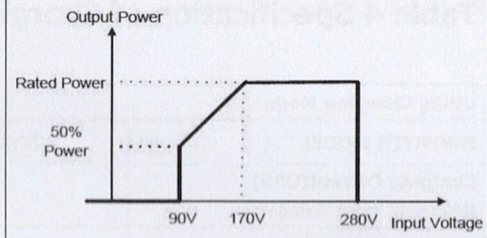
INVERTER MODEL	2.2KVA-12V	3.2KVA-24V
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40±1Hz	
Low Loss Return Frequency	42±1Hz	
High Loss Frequency	65±1Hz	
High Loss Return Frequency	63±1Hz	
Output Short Circuit Protection	Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical(UPS); 20m stypical(Appliances)	
Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.		

Table 2 Specification of Inverter Mode

INVERTER MODEL	2.2KVA-12V	3.2KVA-24V
Rated Output Power	2200VA/1800W	3200VA/3000W
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	60Hz or 50Hz	
Peak Efficiency	94%	
Overload Protection	5s@≥150% load;10s@110%~150% load	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	12 Vdc	24Vdc
Cold Start Voltage	11.5 Vdc	23.0Vdc
Low DC Warning Voltage		
@ Load < 50%	11.0Vdc	22.0Vdc
@ Load ≥ 50%	10.5Vdc	21.0Vdc
Low DC Warning Return Voltage		
@ Load < 50%	11.5Vdc	23.0Vdc
@ Load ≥ 50%	11.0Vdc	22.0Vdc
Low DC Cut-off Voltage		
@ Load < 50%	10.5Vdc	21.0Vdc
@ Load ≥ 50%	10Vdc	20.0Vdc
High DC Cut-off Voltage	16 Vdc	31Vdc
No Load Power Consumption	<35W	
Saving Mode Power Consumption	<10W	<15W

Table 4 Specification of Charging Mode

Utility Charging Mode			
INVERTER MODEL		2.2KVA-12V	3.2KVA-24V
Charging Current(UPS) @Nominal Input Voltage		60A	
Bulk Charging Voltage	Flooded Battery	14.6	29.2
	AGM / Gel Battery	14.1	28.2
Floating Charging Voltage		13.5Vdc	27Vdc
Charging Algorithm		3-Step	

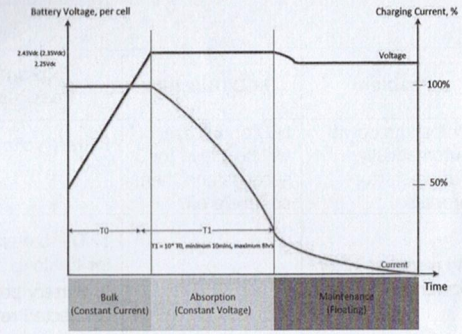
Charging Curve		
Solar Charging Mode		
INVERTER MODEL	2.2KVA-12V	3.2KVA-24V
Rated Power	2000W	3000W
Rated Solar Voltage	300V	
PV Array MPPT Voltage Range	55V-430V	
Max. PV Array Open Circuit Voltage	450V	
Max Charging Current	80A	

Table 5 General specifications

INVERTER MODEL	2.2KVA-12V	3.2KVA-24V
Operating Temperature Range	0°C to 55°C	
Storage temperature	-15°C~ 60°C	
Dimension (D*W*H), mm	405*284*106	
Net Weight, kg	5	5.5

TROUBLE SHOOTING

Problem	LCD/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD and buzzer will be active for 3 seconds and then complete off.	Battery voltage is too low	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	The power-on icon of LCD flashes, and the status indicator icon flashes.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→ Appliance)
Buzzer beeps continuously and the status indicator icon is always on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component are over heated.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan
	Fault code 06/58	Output abnormal	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	